WHAT IS CLAIMED IS:

1. A liquid metal evaporation source for use in Molecular Beam Epitaxy (MBE) or vacuum deposition processes, said source comprising:

a high temperature evaporator;

an intermediate temperature hollow transport tube; and

a low temperature hollow reservoir cylinder with close-mating cylindrical piston;

wherein each of said evaporator, said transport tube and said reservoir cylinder include a radiant resistive heater element with a thermocouple to sense and regulate the heater power, and

wherein at least one conducting probe is used to sense contact with liquid metal in said evaporator by making a low resistance electrical contact in which the level of said conducting probe can be used to control a position of said piston in said reservoir cylinder via an automatic feedback control circuit which drives a motor attached to a linear motion vacuum feedthrough which in turn is attached to said piston and is used to regulate a constant height of said liquid metal in said evaporator to maintain a constant evaporation rate of said liquid metal from said evaporator at a fixed evaporator temperature.

2. An evaporation source according to claim 1, wherein at least one of said evaporator, said hollow transport tube, said reservoir, and said piston are machined from a refractory material.

3. An evaporation source according to claim 2, wherein said refractory material is densified graphite.

4. An evaporation source according to claim 2, wherein at least one of said evaporator, said reservoir cylinder, said transport tube and said piston are coated with a layer of Pyrolytic Graphite (PG).

5. An evaporation source according to claim 2, wherein at least one of said evaporator, said reservoir cylinder, said transport tube and said piston are coated with a layer of Pyrolytic Boron Nitride (PBN).

6. An evaporation source according to claim 2, wherein at least one of said evaporator, said reservoir cylinder, said transport tube and said piston are coated with a layer of Pyrolytic Silicon Carbide (PSiC).

7. An evaporation source according to claim 2, wherein at least one of said evaporator, said reservoir cylinder, said transport tube and said piston are coated with a layer of Pyrolytic Aluminum Nitride (PAN).

8. An evaporation source according to claim 2, wherein at least one of said evaporator, said hollow transport tube and said reservoir cylinder is machined from a single piece of refractory material in essentially a concentric configuration.

9. An evaporation source according to claim 1, wherein said evaporator and said hollow transport tube are joined at a right angle to the axis of said reservoir cylinder by leak-tight flat flanges.

10. An evaporation source according to claim 9, wherein said reservoir cylinder is joined to saïd hollow transport tube and said evaporator via a passageway for said liquid metal.

11. An evaporation source according to claim 9, wherein said leak-tight flat flanges are attached using threaded assemblies.

12. An evaporation source according to claim 9, wherein said leak-tight flat flanges are attached using refractory clamps.

13. An evaporation source according to claim 1, wherein said evaporator and said hollow transport tube are joined at an angle ranging between 0 to 180 degrees to said reservoir cylinder along its axis by leak-tight flanges.

14. An evaporation source according to claim 13, wherein said reservoir cylinder is joined to said hollow transport tube and said evaporator via a passageway for said liquid metal.

15. An evaporation source according to claim 13, wherein said leak-tight flat flanges are attached using refractory clamps.

16. An evaporation source according to claim 13, wherein said leak-tight flat flanges are attached using threaded assemblies.

17. An evaporation source according to claim 16, wherein said refractory clamps are joined together using refractory nuts and bolts preferably made from molybdenum.

18. An evaporation source according to claim 16, wherein said refractory clamps are joined together using refractory nuts and bolts preferably made from densified graphite.

19. An evaporation source according to claim 1, wherein said high temperature evaporator includes an evaporator nosecone.

20. An evaporation source according to claim 19, wherein said evaporator nosecone is of a shape suitable for providing a metal beam flux profile incident upon a substrate.

21. An evaporation source according to claim 1, wherein at least one of said conducting probes are made from a non-reacting refractory material.

22. An evaporation source according to claim 21, wherein said refractory material is densified graphite.

23. An evaporation source according to claim 22, wherein said conducting probes are insulated from each other and insulated from the walls of the evaporator.

24. An evaporation source according to claim 23, wherein said conducting probes are insulated from each other and insulated from the walls of the evaporator using non-conductive ceramic coating.

25. An evaporation source according to claim 23, wherein said ceramic coating is made from pyrolytic boron nitride (PBN).

26. An evaporation source according to claim 24, wherein at least one of said conducting probes is positioned above the surface of said liquid metal.

27. An evaporation source according to claim 24, wherein at least one of said conducting probes is inserted from below the surface of said liquid metal through said evaporator.

28. An evaporation source according to claim 21, wherein at least one of said conducting probes makes a first contact with said liquid metal on its surface and makes a second contact with said liquid metal through conductive walls of said evaporator.

29. An evaporation source according to claim 1, wherein said radiant resistive heater elements are made from refractory materials.

30. An evaporation source according to claim 29, wherein said refractory material is densified graphite.

31. An evaporation source according to claim 30, wherein said radiant resistive heater elements are configured in a serpentine or spiral fashion.

32. An evaporation source according to claim 1, wherein said radiant resistive heater elements are made from Tungsten (W) wire.

33. An evaporation source according to claim 32, wherein said radiant resistive heater elements are configured in a serpentine or spiral fashion.

34. An evaporation source according to claim 1, wherein said radiant resistive heater elements are made from W foil.

35. An evaporation source according to claim 34, wherein said radiant resistive heater elements are configured in a serpentine or spiral fashion.

36. An evaporation source according to claim 1, wherein said radiant resistive heater elements are made from Tantalum (Ta) wire.

37. An evaporation source according to claim 36, wherein said radiant resistive heater elements are configured in a serpentine or spiral fashion.

38. An evaporation source according to claim 1, wherein said radiant resistive heater elements are made from Ta foil.

39 An evaporation source according to claim 38, wherein said radiant resistive heater elements are machined in a serpentine or spiral fashion.

40. An evaporation source according to claim 1, wherein the position of said piston in said reservoir is manually set.

41. An evaporation source according to claim 40, wherein said position is set using a micrometer screw attached to said linear motion vacuum feedthrough attached to a shaft driving said piston.

42. An evaporation source according to claim 41, wherein the position is set using a motor to drive said micrometer screw.

43. An evaporation source according to claim 1, wherein the position of said piston in said reservoir is automatically adjusted.

44. An evaporation source according to claim 43, wherein the position of said piston is automatically adjusted using an electronic feedback control circuit.

45. An evaporation source according to claim 44, wherein said electronic feedback control circuit senses the electrical contact resistance between said liquid metal and said conducting probes.

46. An evaporation source according to claim 45, wherein said electronic feedback control circuit applies power to a motor that drives a micrometer screw attached to said linear motion vacuum feedthrough attached to a shaft driving said piston.

47. An evaporation source according to claim 1, wherein said refractory material for said source is chosen not to react with said liquid metal at temperatures required to achieve evaporation of said liquid metal.

48. An evaporation source according to claim 1, wherein said liquid metal is selected from the group consisting of Silver (Ag), Aluminum (Al), Gold (Au), Boron (B), Barium (Ba), Bismuth (Bi), Cadmium (Cd), Cobolt (Co), Cesium (Cs), Copper (Cu), Iron (Fe), Gallium (Ga), Gadolinium (Gd), Germanium (Ge), Mercury (Hg), Indium (In), Potassium (K), Lanthanum (La), Lithium (Li), Sodium (Na), Nickel (Ni), Lead (Pb), Palladium (Pd), Praseodymium (Pr), Platinum (Pt), Rubidium (Rb), Antimony (Sb), Scandium (Sc), Selenium (Se), Silicon (Si), Tin (Sn), Tellurium (Te), Thallium (Tl), Vanadium (V), Ytterbium (Y), and Zinc (Zn).

49. A liquid metal evaporation source for use in Molecular Beam Epitaxy (MBE) or vacuum deposition processes, said evaporation source comprising:

a first zone maintained at a first temperature;

a second zone maintained at a second temperature; and

a third zone maintained at a third temperature;

wherein each of said first, second and third zones include a heater means for sensing and regulating said first, second and third temperatures, and

wherein said first, second and third zones are in fluid communication.

50. A liquid metal evaporation source according to claim 49, wherein said first zone includes an evaporator, said second zone includes a hollow transport tube, and said third zone includes a reservoir with a close-mating piston.

51. A liquid metal evaporation source according to claim 50, wherein at least one of said evaporator, said hollow transport tube and said reservoir is made from refractory material.

52. An evaporation source according to claim 51, wherein said refractory material is densified graphite.

53. An evaporation source according to claim 52, wherein said refractory material does not react with said liquid metal at temperatures required for evaporation of said liquid metal.

54. An evaporation source according to claim 51, wherein at least one of said evaporator, said hollow transport tube and said reservoir is coated with a layer of material selected from the group consisting of Pyrolytic Graphite (PG), Pyrolytic Boron Nitride (PBN), Pyrolytic Silicon Carbide (PSiC), and Pyrolytic Aluminum Nitride (PAN).

55. A liquid metal evaporation source according to claim 50, wherein said evaporation source includes at least one conducting probe used to sense contact with liquid metal in said evaporator.

56. An evaporation source according to claim 55, wherein at least one of said conducting probes is made from a non-reacting refractory material.

57. An evaporation source according to claim 56, wherein said non-reacting refractory material is densified graphite.

58. An evaporation source according to claim 57, wherein said conducting probes are insulated from each other and insulated from the walls of said evaporator.

59. An evaporation source according to claim 58, wherein ceramic coating is said insulator.

60. An evaporation source according to claim 58, wherein said ceramic coating is made from pyrolytic boron nitride (PBN).

61. An evaporation source according to claim 60, wherein at least one of said conducting probes is positioned above the surface of said liquid metal.

62. An evaporation source according to claim 60, wherein at least one of said conducting probes is inserted from below the surface of said liquid metal through said evaporator.

63. An evaporation source according to claim 55, wherein at least one of said conducting probes makes a first contact with said liquid metal on its surface and makes a second contact with said liquid metal through conductive walls of said evaporator.

64. A liquid metal evaporation source according to claim 63, wherein said at least one conducting probe controls the position of said piston via an automatic feedback control circuit.

65. A liquid metal evaporation source according to claim 64, wherein said automatic feedback control circuit drives a motor attached to said piston and regulates a constant height of said liquid metal in said evaporator.

66. An evaporation source according to claim 50, wherein at least one of said evaporator, said hollow transport tube, and said reservoir are made from a single piece of refractory material in essentially a concentric configuration.

67. An evaporation source according to claim 50, wherein said evaporator and said hollow transport tube are joined at a right angle to the axis of said reservoir by leak-tight flat flanges.

68. An evaporation source according to claim 67, wherein said evaporation source includes a co-joining passageway for said liquid metal between said reservoir and said hollow transport tube.

69. An evaporation source according to claim 67, wherein said leak-tight flat flanges are attached using threaded assemblies.

70. An evaporation source according to claim 67, wherein said leak-tight flat flanges are attached using refractory clamps.

71. An evaporation source according to claim 70, wherein said refractory clamps are joined using refractory nuts and bolts.

72. An evaporation source according to claim 50, wherein said evaporator and said hollow transport tube are joined at an angle in the range of 0 to 180 degrees to said reservoir along its axis by leak-tight flanges.

73. An evaporation source according to claim 72, wherein said evaporation source includes a co-joining passageway for said liquid metal between said reservoir and said hollow transport tube.

74. An evaporation source according to claim 72, wherein said leak-tight flat flanges are attached using threaded assemblies.

75. An evaporation source according to claim 72, wherein said leak-tight flat flanges are attached using refractory clamps.

76. An evaporation source according to claim 75, wherein said refractory clamps are joined together using refractory nuts and bolts.

77. An evaporation source according to claim 50, wherein said evaporator includes an evaporator nosecone.

78. An evaporation source according to claim 77, wherein said evaporator nosecone is configured to a shape suitable for providing a metal beam flux profile incident upon a substrate.

79. A liquid metal evaporation source according to claim 49, wherein said first temperature is higher than said second temperature.

80. A liquid metal evaporation source according to claim 48, wherein said second temperature is higher than said third temperature.

81. An evaporation source according to claim 49, wherein said heater means is made from refractory materials.

82. An evaporation source according to claim 81, wherein said heater means is configured in a serpentine or spiral fashion.

83. An evaporation source according to claim 49, wherein said heater means is densified graphite.

84. An evaporation source according to claim 49, wherein said heater means is made from Tungsten (W) wire.

85. An evaporation source according to claim 84, wherein said heater means is configured in a serpentine or spiral fashion.

86. An evaporation source according to claim 49, wherein said heater means is made from W foil.

87. An evaporation source according to claim 86, wherein said heater means is configured in a serpentine or spiral fashion.

88. An evaporation source according to claim 49, wherein said heater means is made from Tantalum (Ta) wire.

89. An evaporation source according to claim 88, wherein said heater means is configured in a serpentine or spiral fashion.

90. An evaporation source according to claim 49, wherein said heater means is made from Ta foil.

91. An evaporation source according to claim 90, wherein said heater means is configured in a serpentine or spiral fashion.

92. An evaporation source according to claim 50, wherein the position of said piston in said reservoir is manually set.

93. An evaporation source according to claim 92, wherein said position is set using a micrometer screw attached to said linear motion vacuum feedthrough attached to a shaft driving said piston.

94. An evaporation source according to claim 93, wherein the position is set using a motor to drive said micrometer screw.

95. An evaporation source according to claim 50, wherein the position of said piston in said reservoir is automatically adjusted.

96. An evaporation source according to claim 95, wherein the position of said piston is automatically adjusted using an electronic feedback control circuit.

97. An evaporation source according to claim 96, wherein said electronic feedback control circuit senses the electrical contact resistance between said liquid metal and said conducting probes.

98. An evaporation source according to claim 97, wherein said electronic feedback control circuit applies power to a motor that drives a micrometer screw attached to said linear motion vacuum feedthrough attached to a shaft driving said piston.

99. An evaporation source according to claim 51, wherein said refractory material for said source is chosen not to react with said liquid metal at temperatures required to achieve evaporation of said liquid metal.

100. An evaporation source according to claim 49, wherein said liquid metal is selected from the group consisting of Silver (Ag), Aluminum (Al), Gold (Au), Boron (B), Barium (Ba), Bismuth (Bi), Cadmium (Cd), Cobolt (Co), Cesium (Cs), Copper (Cu), Iron (Fe), Gallium (Ga), Gadolinium (Gd), Germanium (Ge), Mercury (Hg), Indium (In), Potassium (K), Lanthanum (La), Lithium (Li), Sodium (Na), Nickel (Ni), Lead (Pb), Palladium (Pd), Praseodymium (Pr), Platinum (Pt), Rubidium (Rb), Antimony (Sb), Scandium (Sc), Selenium (Se), Silicon (Si), Tin (Sn), Tellurium (Te), Thallium (Tl), Vanadium (V), Ytterbium (Y), and Zinc (Zn).

101. A liquid metal evaporation source for use in Molecular Beam Epitaxy (MBE) or vacuum deposition processes, said evaporation source comprising:

an evaporator;

a transport tube; and

a reservoir with close-mating piston;

wherein each of said evaporator, said transport tube and said reservoir include a heater element having a thermocouple for sensing and regulating the temperature, and

wherein said evaporator, said transport tune and said reservoir are in fluid communication.

102. A liquid metal evaporation source according to claim 101, wherein said evaporator is maintained at a high temperature.

103 A liquid metal evaporation source according to claim 101, wherein said transport tube is maintained at a temperature lower than said evaporator.

104. A liquid metal evaporation source according to claim 101, wherein said reservoir is maintained at a lower temperature than said transport tube.

105. A liquid metal evaporation source according to claim 101, wherein at least one of said evaporator, said transport tube and said reservoir is made from refractory material.

106. An evaporation source according to claim 101, wherein said refractory material is densified graphite.

107. An evaporation source according to claim 105, wherein said refractory material does not react with said liquid metal at temperatures required for evaporation of said liquid metal.

108. An evaporation source according to claim 101, wherein at least one of said evaporator, said transport tube and said reservoir is coated with a layer of material selected from the group consisting of Pyrolytic Graphite (PG), Pyrolytic Boron Nitride (PBN), Pyrolytic Silicon Carbide (PSiC), and Pyrolytic Aluminum Nitride (PAN).

109. A liquid metal evaporation source according to claim 101, wherein said evaporation source includes at least one conducting probe used to sense contact with liquid metal in said evaporator.

110. An evaporation source according to claim 109, wherein at least one of said conducting probes is made from a non-reacting refractory material.

111. An evaporation source according to claim 110, wherein said non-reacting refractory material is densified graphite.

112. An evaporation source according to claim 111, wherein said conducting probes are insulated from each other and insulated from the walls of said evaporator.

113. An evaporation source according to claim 112, wherein ceramic coating is said insulator.

114. An evaporation source according to claim 113, wherein said ceramic coating is made from pyrolytic boron nitride (PBN).

115. An evaporation source according to claim 109, wherein at least one of said conducting probes is positioned above the surface of said liquid metal.

116. An evaporation source according to claim 109, wherein at least one of said conducting probes is inserted from below the surface of said liquid metal through said evaporator.

117. An evaporation source according to claim 109, wherein at least one of said conducting probes makes a first contact with said liquid metal on its surface and makes a second contact with said liquid metal through conductive walls of said evaporator.

118. A liquid metal evaporation source according to claim 109, wherein said at least one conducting probe controls the position of said piston via an automatic feedback control circuit.

119. A liquid metal evaporation source according to claim 118, wherein said automatic feedback control circuit drives a motor attached to said piston and regulates a constant height of said liquid metal in said evaporator.

120. An evaporation source according to claim 101, wherein at least one of said evaporator, said transport tube, and said reservoir are made from a single piece of refractory material in essentially a concentric configuration.

121. An evaporation source according to claim 101, wherein said evaporator and said transport tube are joined at a right angle to the axis of said reservoir by leak-tight flat flanges.

122. An evaporation source according to claim 121, wherein said evaporation source includes a co-joining passageway for said liquid metal between said reservoir and said transport tube.

123. An evaporation source according to claim 121, wherein said leak-tight flat flanges are attached using threaded assemblies.

124. An evaporation source according to claim 121, wherein said leak-tight flat flanges are attached using refractory clamps.

125. An evaporation source according to claim 124, wherein said refractory clamps are joined using refractory nuts and bolts.

126. An evaporation source according to claim 101, wherein said evaporator and said transport tube are joined at an angle in the range of 0 to 180 degrees to said reservoir along its axis by leak-tight flanges.

127. An evaporation source according to claim 126, wherein said evaporation source includes a co-joining passageway for said liquid metal between said reservoir and said transport tube.

128. An evaporation source according to claim 126, wherein said leak-tight flat flanges are attached using threaded assemblies.

129. An evaporation source according to claim 126, wherein said leak-tight flat flanges are attached using refractory clamps.

130. An evaporation source according to claim 129, wherein said refractory clamps are joined together using refractory nuts and bolts.

131. An evaporation source according to claim 101, wherein said evaporator includes an evaporator nosecone.

132. An evaporation source according to claim 131, wherein said evaporator nosecone is configured to a shape suitable for providing a metal beam flux profile incident upon a substrate.

133. An evaporation source according to claim 101, wherein said heater means is made from refractory materials.

134. An evaporation source according to claim 133, wherein said heater means is densified graphite.

135. An evaporation source according to claim 134, wherein said heater means is configured in a serpentine or spiral fashion.

136. An evaporation source according to claim 101, wherein said heater means is made from Tungsten (W) wire.

137. An evaporation source according to claim 136, wherein said heater means is configured in a serpentine or spiral fashion.

138. An evaporation source according to claim 101, wherein said heater means is made from W foil.

139. An evaporation source according to claim 138, wherein said heater means is configured in a serpentine or spiral fashion.

140. An evaporation source according to claim 101, wherein said heater means is made from Tantalum (Ta) wire.

141. An evaporation source according to claim 140, wherein said heater means is configured in a serpentine or spiral fashion.

142. An evaporation source according to claim 101, wherein said heater means is made from Ta foil.

143. An evaporation source according to claim 142, wherein said heater means is configured in a serpentine or spiral fashion.

144. An evaporation source according to claim 101, wherein the position of said piston in said reservoir is manually set.

145. An evaporation source according to claim 144, wherein said position is set using a micrometer screw attached to said linear motion vacuum feedthrough attached to a shaft driving said piston.

146. An evaporation source according to claim 145, wherein the position is set using a motor to drive said micrometer screw.

147. An evaporation source according to claim 101, wherein the position of said piston in said reservoir is automatically adjusted.

148. An evaporation source according to claim 147, wherein the position of said piston is automatically adjusted using an electronic feedback control circuit.

149. An evaporation source according to claim 148, wherein said electronic feedback control circuit senses the electrical contact resistance between said liquid metal and said conducting probes.

150. An evaporation source according to claim 149, wherein said electronic feedback control circuit applies power to a motor that drives a micrometer screw attached to said linear motion vacuum feedthrough attached to a shaft driving said piston.

151. An evaporation source according to claim 101, wherein said refractory material for said source is chosen not to react with said liquid metal at temperatures required to achieve evaporation of said liquid metal.

152. An evaporation source according to claim 101, wherein said liquid metal is selected from the group consisting of Silver (Ag), Aluminum (Al), Gold (Au), Boron (B), Barium (Ba), Bismuth (Bi), Cadmium (Cd), Cobolt (Co), Cesium (Cs), Copper (Cu), Iron (Fe), Gallium (Ga), Gadolinium (Gd), Germanium (Ge), Mercury (Hg), Indium (In), Potassium (K), Lanthanum (La), Lithium (Li), Sodium (Na), Nickel (Ni), Lead (Pb), Palladium (Pd), Praseodymium (Pr), Platinum (Pt), Rubidium (Rb), Antimony (Sb), Scandium (Sc), Selenium (Se), Silicon (Si), Tin (Sn), Tellurium (Te), Thallium (Tl), Vanadium (V), Ytterbium (Y), and Zinc (Zn).